Claims :

1. An optical device comprising at least

a light-transmittive, substantially planar waveguiding substrate for guiding a light wave within the substrate in a direction of the substrate plane based substantially on total internal reflections,

a preformed, diffractive grating structure carried by the waveguiding substrate and arranged to couple energy of the light wave between the substrate and surroundings thereof,

wherein said preformed, diffractive grating structure is a preformed surface relief arranged on an electrically deformable dielectric and viscoelastic layer, and that the device further comprises at least

a first light-transmittive electrode structure arranged between the waveguiding substrate and the viscoelastic layer,

a second light-transmittive electrode structure arranged opposite to the viscoelastic layer leaving a dielectric gap towards a free surface of the viscoelastic layer having a surface relief, and

control means for applying control voltage between the first and second electrode structures to generate an electric field passing through an interface between the viscoelastic layer and the dielectric gap in order to electrically deform the surface relief of the viscoelastic layer.

2. The device according to the claim 1, wherein said control means are arranged to electrically deform the surface relief of the viscoelastic layer sequentially in time.

3. The device according to the claim 2, wherein the deformation of the surface relief of the viscoelastic layer is adjusted to produce desired diffraction properties for given wavelengths of the light wave.

4. The device according to the claim 3, wherein the diffraction properties of the surface relief of the viscoelastic layer are arranged to be substantially similar for all of the given wavelengths of the light wave.

5. The device according to claim 1, wherein the material of the viscoelastic layer is a preformable polymer compound.

6. The device according to claim 1, wherein the material of the dielectric gap is air, gas or vacuum.

7. The device according to claim 1, wherein at least one of the first and second electrode structures comprises a single and substantially planar electrode zone.

8. The device according to claim 1, wherein at least one of the first and second electrode structures comprises multiple electrode zones.

9. The device according to claim 1, wherein at least one of the first and second electrode structures is of a light-transmittive type.

10. The device according to claim 1, wherein the device is arranged to alter at least one cross-sectional dimension of the light wave coupled between the substrate and the surroundings.

11. The device according to the claim 10, wherein multiple devices are arranged on a common waveguiding substrate in order to alter several cross-sectional dimensions of the light wave.

12. The device according to claim 1, wherein the device is arranged to enlarge the exit pupil of an optical system.

13. The device according to claim 1, wherein the device is arranged to enlarge the exit pupil of a virtual display.

14. The device according to claim 1, wherein the device is arranged to enlarge the exit pupil of a sequential color virtual display and the diffraction properties of the viscoelastic layer are arranged to control colour uniformity of said virtual display.